
घूमने वाले क्रशर के लिए विशिष्टि
(पहला पुनरीक्षण)

Specification for Roll Crusher
(First Revision)

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FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Construction Plant and Machinery Sectional Committee had been approved by the Mechanical Engineering Division Council.

This Indian Standard was first published in 1979. The first revision has been taken up to keep pace with the latest technological developments and international practices. In this revision, the following major changes have been made:

- a) The scope of the standard has been modified; and
- b) Clause 9 regarding marking has been added.

Particulars regarding information to be given to the manufacturer by the purchaser with enquiry or order and the information to be furnished by the manufacturer to the purchaser along with the quotation are given in Annex A and B respectively.

The composition of the Committee responsible for the formulation of this standard is given in Annex D.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

SPECIFICATION FOR ROLL CRUSHER

(First Revision)

1 SCOPE

This standard covers the design and supply of roll crushers which are commonly used for crushing rocks, minerals, coke, coal and similar materials.

2 NOMENCLATURE AND TERMINOLOGY

For the purpose of this standard, the various components of the roll crusher shall be as designated in Fig. 1.

2.1 Roll Crusher — A machine for crushing rocks, minerals, coal, coke and similar materials, mainly by compression between two rotating cylindrical surfaces rotating towards each other; or one stationary surface (either curved or straight) and one rotating cylindrical surface; or three rotating cylindrical surfaces so arranged that material to be crushed passes between any two rotating cylindrical surfaces at one time.

3 CLASSIFICATION

For the purpose of this standard, the roll crusher shall be classified as follows.

3.1 Classification Depending Upon the Roll Surface

Depending upon the type of roll surface, a roll crusher may be of smooth, beaded, spoked or corrugated roll type.

3.1.1 Smooth Roll Crusher

A crushing machine where the roll or rolls surfaces are smooth.

3.1.2 Beaded Roll Crusher

A crushing machine where the roll surface is beaded.

3.1.3 Spiked or Toothed Roll Crusher

A crushing machine where the roll surface is composed of spikes or teeth (of different shapes and sizes based on individual manufacturer's design), made up by the combination of circular rings or longitudinally curved sectors carrying such spikes or teeth.

3.1.4 Corrugated Roll Crusher

A crushing machine where the roll surface is corrugated. It can comprise of one corrugated and one smooth roll surface or both the roll surfaces corrugated.

3.2 Classification Depending Upon Number of Rotating Rolls

Depending upon the number of rolls the crusher may be single, double or triple.

3.2.1 Single Roll Crusher

A crusher having a single roll that rotates towards a stationary surface (see Fig. 1). The roll or rolls may be made up of crushing rings of different shapes and sizes based on individual design and the specific application. The stationary surface may be plain or of toothed design, straight or curved.

3.2.2 Double Roll Crusher

A crusher having two rolls rotating towards each other (see Fig. 2).

3.2.3 Triple Roll Crusher

A crusher having a rotating roll (of same or different diameter) so arranged that material to be crushed passes between one set of two such rolls at one time or is composed of a single and double roll crusher.

4 PRINCIPLE OF OPERATION

The raw material is crushed by one, two or three rolls, the feed size restricted by the angle of nip.

4.1 The feed lump size is governed by the roll diameter since a certain angle of the nip should not be exceeded. If feed size larger than the specified one is fed, the material may simply ride on roll surface and thereby cause choking.

4.2 Furthermore, a certain degree of reduction to match the characteristics of the feed material is adhered to and the peripheral speed of roll is matched with the crushing process. Consequently, feed size, roll diameter and length, roll speed, roll setting determine the output.

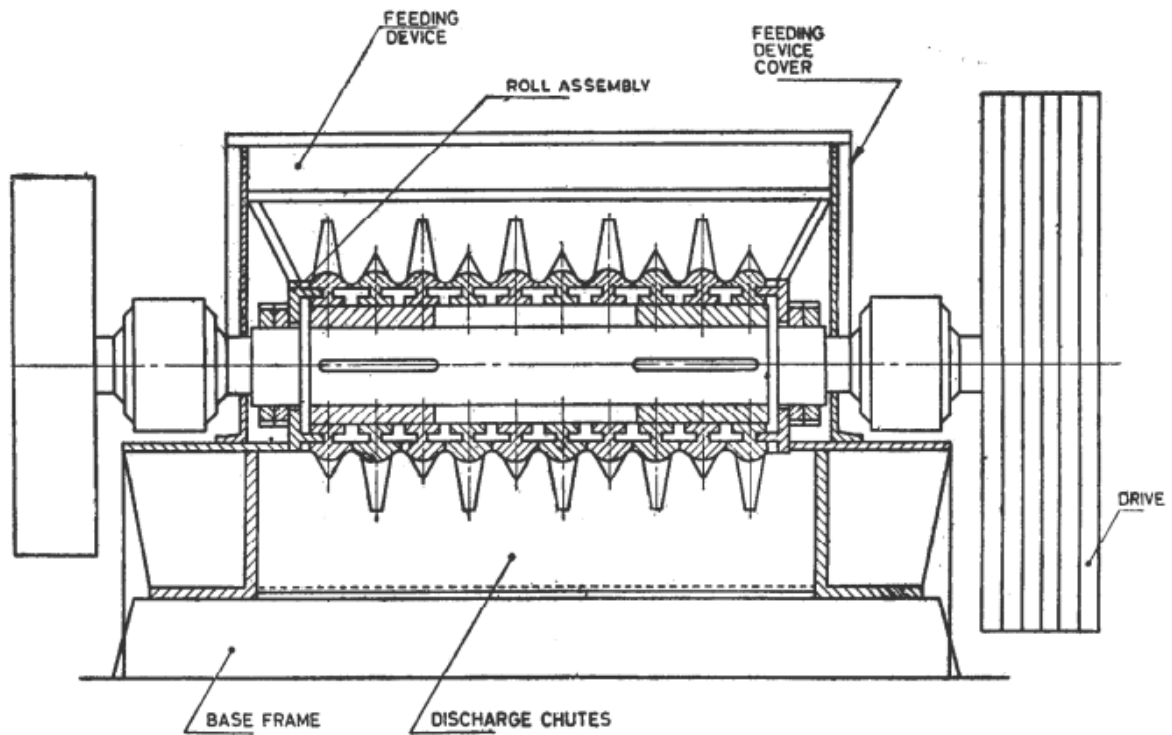


FIG. 1 SINGLE ROLL CRUSHER

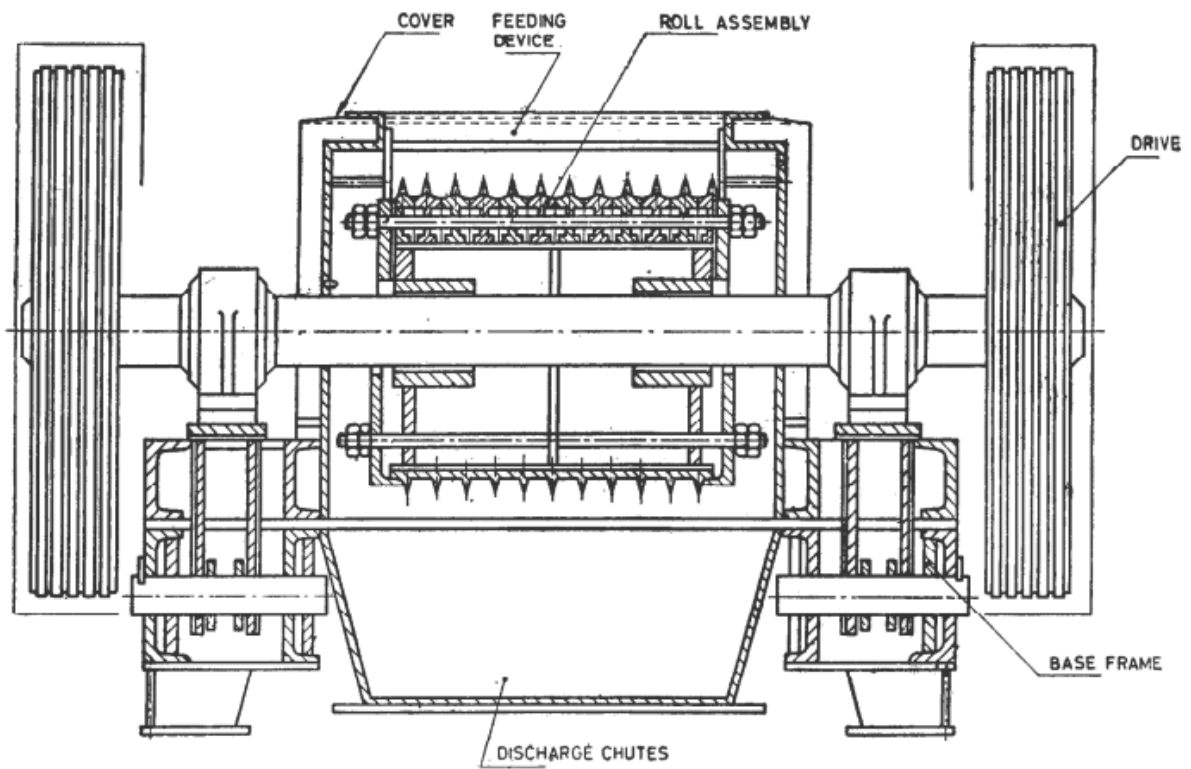


FIG. 2 DOUBLE ROLL CRUSHER

5 CONSTRUCTION

The roll crusher shall comprise of the following parts (see Fig. 1 and 2):

- a) Base frame;
- b) Roll assembly;
- c) Drive unit;
- d) Cover;
- e) Roll gap adjustment and safety device;
- f) Feeding device and discharge chutes;
- g) Attachment for maintenance of rolls; and
- h) Electric motor/prime mover.

The various parts mentioned above shall conform to the requirements given in 5.1 to 5.7.

5.1 Base Frame

It shall serve the purpose of supporting the rolls, housing, adjustment assembly, and the drive motor/prime movers. Secondly, it shall also serve the purpose of locating the floating roll parallel to the axis of the fixed roll.

5.1.1 It shall consist of an adequately strong fabricated steel frame made out of rolled steel sections.

5.2 Roll Assembly

One roll shall be fixed while the other shall be of floating design. The floating roll shall serve the purposes of:

- a) giving way when any occasional uncrushable material fails into the feed opening and thus safeguarding the crusher; and
- b) adjustment of the setting of the crusher for different applications as well as for compensating for the wear and tear of the roll surface.

5.2.1 The roll assembly shall consist of the shaft, roll hub, locking ring, roll shell (or rings or segments depending on type and size of roll crusher), bearings housed in dust-proof labyrinth rings with greasing arrangements for labyrinths and bearings.

5.2.2 The roll shaft shall be of forged or rolled alloy steel, or medium carbon steel, running in self-aligning heavy-duty spherical or taper roller bearings. The roll hub shall be of cast iron or cast steel. The wearing roll tyre shall be of suitable wear-resistant alloy steel.

5.2.3 The roll width may be varying from 0.66 to 3.0 times the roll diameter depending upon the capacity of the crusher.

5.3 Drive Unit

The drive to roll crusher will be such that all the rolls will be individually driven or through suitable gears or pneumatic tyres. The prime mover may be an electric motor, flameproof or non-flame proof as per requirement.

5.3.1 Power developed and transmitted by the power unit shall be adequate for the duty to be performed. The power unit shall conform to relevant Indian Standard.

5.4 Cover

The purpose of the cover is to minimize dust nuisance and is to guide the feed material into the roll cavity through the sidelines, which shall also minimize spillage.

5.4.1 The cover shall consist of the number of suitably welded sections fitted with at least two numbers of inspection windows. The sections shall be bolted together to permit easy dismantling during maintenance. The cover shall be suitably secured to the base frame by means of a rapid lock mechanism.

5.5 Roll Gap Adjustment and Safety Device

The roll gap shall be adjusted by moving the floating roll either towards or away from the stationary roll. This setting shall be adjustable by means of operating a hand wheel or similar device so located to permit easy operation. The adjustment shall be possible by keeping the floating roll axis parallel to the fixed roll axis.

5.5.1 The roll crusher shall be equipped with a safety device for protecting the crusher against any occasional uncrushable material entering the crusher. This shall be achieved by providing either a shear pin or a breaker bolt or spring loading attachment, which yields.

5.5.2 Heavy duty roll crushers shall be provided with either single or combination of truncated cone springs or both annular springs ensuring damped recoil; or with hydraulic springs. Soon after the removal of uncrushable foreign matter, the springs shall regain their original prefixed position.

5.5.3 The above two arrangements, that is roll gap adjustment or overload safety shall be either grouped together in one device or arranged separately.

5.6 Feeding and Discharge Chutes

Depending upon the individual requirement, a suitable individual requirement, a suitable feeding device may be incorporated. Special consideration needs to be given to the height of drop of material and uniform feeding across the entire width of the rolls. Incorrect attention in this respect may have an unfavourable effect on throughput and may result in uneven wear of roll surfaces.

5.6.1 Where required, depending upon the understanding between manufacturer and purchaser, suitable discharge chutes shall be given.

5.6.2 Suitable flange connections at the feeding and discharge sides shall be given.

5.7 Attachment for Maintenance of Rolls

In order to maintain the roll surfaces properly, either the rolls have to be built up by welding or by grinding corrugation, if any, which develops on smooth roll surfaces during crushing may have to be removed. The following attachment may have to be procured in consultation with the manufacturer.

5.7.1 To build up the roll surface by welding, the manufacturer will offer a suitable kit where required by the purchaser.

5.7.1.1 In the case of smooth roll crushers, where required by the purchaser, the manufacturer shall provide a suitable grinding attachment to remove the possible corrugations that may have taken place during crushing. The attachment shall be such that both the rolls are face milled simultaneously in a single work cycle. The operation will be such that longitudinal movement of the attachment shall be automatic with the only feed out being given manually.

5.7.1.2 Alternatively, where required, a suitable arrangement may be given on one of the rolls for axial shifting of the same to remove corrugation.

6 GENERAL REQUIREMENTS

6.1 Safety Requirements

The design of the crusher shall minimize hazards to the operator. All gears, pulleys, chains, belt sprockets, dangerous moving parts and parts that are subject to high operating temperatures or are energized electrically shall be insulated, well-guarded and protected.

6.2 The roll shall be housed suitably in dust-proof covers and if required by the purchaser, a suitable flange connection for the dust extraction system may be incorporated. Similarly, if required by the purchaser, the machine may be mounted on vibration mounts to dampen the crusher vibrations.

6.3 To facilitate changing of rolls and for conducting maintenance work on the crusher, if required by the purchaser, the crusher may be provided with collapsible wheels, so that the crusher can be brought out of the feeding chute.

6.4 Maintenance Accessibility

The design of the crusher shall provide convenient access to all components, sub-assemblies and parts for maintenance and repairs.

6.5 Lubrication

Lubrication means shall be provided for the bearings and other parts requiring lubrication. All lubricating nipples shall be of a similar type, preferably located centrally with properly arranged grease or oil pipes. Lubrication points shall be conspicuously marked to

identify them. Chains shall be enclosed, and where standard reduction gearboxes are used, the same shall conform to relevant Indian Standard.

6.6 Automatic greasing station may be provided if required by the purchaser.

6.7 Where the crusher is used for crushing hot materials, suitable cooling arrangements for shafts and bearings shall be provided.

6.8 Maintenance Tools and Manual

A strong toolbox with lock and key containing the special and normal tools for maintaining the roll crusher together with instruction and maintenance manual shall be provided. The toolbox shall be suitably affixed to the machine.

7 DESIGNATION

The designation of roll crusher shall include:

- a) Commonly used name;
- b) Number of rolls;
- c) Type of roll surface – S = smooth, B = beaded, T = toothed and C = corrugated;
- d) Roll diameter in millimetres;
- e) Roll rpm or peripheral speed...m/s;
- f) Roll width in millimetres; and
- g) Number of this standard.

Example:

A roll crusher comprising of two smooth rolls of diameter 1000 mm and width 1200 mm be designated as Double Roll Crusher, Types S, 1000 × 1200 mm, IS 9303

8 SUPPLY

The manufacturer shall supply a certificate to the purchaser along with each machine certifying that the crusher has been inspected for freedom from visible defects and the crusher has satisfactorily withstood the trial run. Items to be covered under this certificate are given in Annex C. The purchaser may inspect the machine during and after fabrication.

8.1 Crusher shall generally meet the application data provided by the purchaser and agreed to by the supplier.

8.2 For large crushers, a load test shall be conducted at the purchaser's end.

9 MARKING PLATE

9.1 Each machine shall have a plate firmly attached to it clearly visible and not easily removable. The plate shall have marked on it the following information:

- a) Manufacturer's name and address or trademark;
- b) Manufacturer's reference/model number of the machine;

- c) Type of machine (*see* 7); and
- d) Month and Year of manufacture.

9.2 BIS Certification Marking

The product(s) conforming to the requirements of this Standard may be certified as per the conformity

assessment schemes under the provisions of the *Bureau of Indian Standards Act, 2016* and the Rules and Regulations framed thereunder, and the product(s) may be marked with the Standard Mark.

ANNEX A

(Foreword)

INFORMATION TO BE SUPPLIED BY THE PURCHASER TO THE MANUFACTURER WITH THE ENQUIRY AND ORDER

A-1 The enquiry and order should state:

- a) Description of feed material to be crushed;
- b) Bulk density in kg/m³ of feed material;
- c) Condition of feed material (dusty, moist, hard, medium-hard, soft, clean, dirty). If moist, percentage of moisture;
- d) Structure of feed material (crystalline or granular or slabby);
- e) Crushing strength (work index, flakiness index, elongation index);
- f) Size range of feed material in mm; and
- g) Duty (continuous or intermittent).

ANNEX B

(Foreword)

INFORMATION TO BE FURNISHED BY THE MANUFACTURER TO THE PURCHASER ALONG WITH THE QUOTATION AND SUPPLY

B-1 The manufacturer shall give the following information along with his quotation and supply:

- a) Size and designation of roll crusher;
- b) Maximum feed size in millimetres;
- c) Minimum and maximum size of discharge in millimetres with guaranteed sieve analysis;
- d) Capacity in tonne per hour mentioning the bulk density taken into consideration;
- e) Power requirements at the output of motor/prime mover shaft in kW;
- f) Details of crusher underlying the materials of construction type and size of important components, such as shafts, roll hub, rolls and bearings, drive units, roll gap adjustment and safety devices, etc.;
- g) Expected product analysis at different settings;
- h) Normal expected life;
- j) List of recommended spares for 2 years of normal operation; and
- k) General arrangement drawing giving overall dimensions, foundation plan and loading size and details of input and output flanges.

ANNEX C

(Clause 8)

INFORMATION TO BE GIVEN IN THE CERTIFICATE BY THE MANUFACTURER TO THE PURCHASER AT THE TIME OF SUPPLYING THE MACHINE

C-1 INSPECTION

The inspection report shall state that each part of the crusher has been inspected before painting to ensure that it is free from any visible defects in casting, machining, etc.

C-2 TEST RUN

The test run report shall state the following:

- a) The number of hours the crusher has been run continuously under no-load after completion of the assembly; and
- b) That after dismantling the crusher consequent to the trial run, inspection has been carried out to ensure that:
 - 1) the construction of the crusher is satisfactory;
 - 2) lubricating condition is satisfactory;
 - 3) there is no slackness or unusual wear on any component; and
 - 4) the bearings are evenly loaded.

ANNEX D*(Foreword)***COMMITTEE COMPOSITION**

Construction Plant and Machinery Sectional Committee, MED 18

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Directorate General of Quality Assurance, Ministry of Defence, New Delhi	BRIG P. K. SHRIVASTAVA (Chairman)
AIMIL Limited, New Delhi	SHRI ROHITASH BARUA SHRI K. K. V. YASAS (<i>Alternate</i>)
Airports Authority of India, New Delhi	SHRI G. K. CHOUDHARY SHRI R. L. SHARMA (<i>Alternate</i>)
Ammann Apollo India Private Limited, Gujarat	SHRI GIRISH DIXIT SHRI ASHISH PATEL (<i>Alternate I</i>) SHRI MANAN RAJPURA (<i>Alternate II</i>) SHRI PRASAD DAYAL (<i>Alternate III</i>) SHRI GEETESH MAKADIA (<i>Alternate IV</i>) SHRI ARPAN PATEL (<i>Alternate V</i>)
Atlas Copco India Limited, Pune	SHRI VIJAY SHARMA SHRI YOGESH TULJAPURKAR (<i>Alternate</i>)
Ajax Engineering Private Limited, Bengaluru	SYED MOHAMMED RIAZ NAWAZ SHRI JORLIN P. V. (<i>Alternate</i>)
B G Shirke Construction Technology Limited, Pune	SHRI A. D. BHOSALE SHRI SUNIL KEDAR (<i>Alternate</i>)
CSIR-Central Building Research Institute, Roorkee	DR SUVIR SINGH DR BANTI A. GEDAM (<i>Alternate</i>)
Caterpillar India Private Limited, Chennai	SHRI K. REJI JOSE SHRI RAMESH VISHWANATHAN (<i>Alternate</i>)
Central Water Commission, New Delhi	SHRI ATUL JAIN SHRI YOGESH PAITHANKAR (<i>Alternate</i>)
Chief Quality Assurance Establishment, Ministry of Defence, New Delhi	COL SURESH K. LT COL A. K. MAURYA (<i>Alternate</i>)
Directorate General Border Roads, New Delhi	SHRI P. R. RAY COL MANJUNATH BT (<i>Alternate</i>)
Escorts Construction Equipment Limited, Faridabad	SHRI FAIZ AHMAD SHRI ASHOK CHAUHAN (<i>Alternate I</i>) SHRI LAXMI CHAND TYAGI (<i>Alternate II</i>)
Epiroc Mining India Limited, Nashik	SHRI VENKATESAN BASHYAM SHRI MUTTANNA JAPANNANAVAR (<i>Alternate</i>)
IRCON International Limited, New Delhi	SHRI RANDHIR GUPTA SHRI S. K. RAY (<i>Alternate</i>)
Indian Construction Equipment Manufacturers Association, New Delhi	SHRI K. V. KRISHNAMURTHY
Jaypee India Limited, Kolkata	SHRI KUMAR M. MEHTA SHRI RAHUL KUMAR TEOTIA (<i>Alternate</i>)
John Deere India Private Limited, Mumbai	SHRI KARTHIK KALIAPPAN SHRI RAJ ANAND (<i>Alternate</i>)

<i>Organization</i>	<i>Representative(s)</i>
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Larsen and Toubro Limited, Bengaluru	SHRI K. KESHAVA SHRI M. SURESH KUMAR (<i>Alternate</i>)
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National Council for Cement and Building Materials, Faridabad	SHRI KAPIL KUKREJA SHRI SAURABH BHATNAGAR (<i>Alternate</i>)
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Amendments Issued Since Publication

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